Technical Guidance for the Use of Injectable Medications

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Appendices:

1. Purpose

The purpose of the Bureau of Prisons (BOP) *Technical Guidance for the Use of Injectable Medications* is to provide expectations and recommendations for the safe and cost-effective delivery of injectable medications within BOP facilities.

The guidance is designed to direct providers in fulfilling the following objectives:

- Determine the types of injectable services that institutions will offer.
- Prepare injectable medications in a safe manner that minimizes the potential for microbial contamination and complies with applicable standards.
- Care for inmates requiring catheter devices.
- Provide cost-effective, medically necessary medical care.
- Maximize the provision of care within the secure confines of the institution.

2. Goals in Providing Injectable Medication Services

All institutions should develop a plan to provide certain injectable medication services within the secure confines of the institution, as outlined in this guidance. Security and administration issues should be worked out at the local level. MAST (Medical Asset Support Team) staff and institutions already implementing such plans are available for consultation and assistance.

Once a plan for providing injectable medication services is in place, the institution should attempt to obtain ready-to-use preparations from commercially available sources. These preparations may be manufacturer pre-made infusion bags, pre-made frozen intravenous (IV) bags, or IV bag and vial systems (see *Section 11*, *Supplies and Storage*).

When an institution needs to provide an injectable product that is not available in a manufactured ready-to-use form, or if compounding the injectable product is determined to be cost-effective, the medication must be compounded under United States Pharmacopeia (USP) General Chapter <797> Pharmaceutical Compounding Sterile Preparations standards. USP <797> establishes standards to ensure that *compounded sterile products* (CSPs) are of a high quality.

All medications received while under BOP care, including medications prepared and/or administered off-site, are to be included within the electronic health record (EHR) medication profile.

If an institution must compound an injectable medication, they should adhere to the following:

Care Level 4 Institutions

- Care Level 4 facilities will prepare and administer all medium-risk and low-risk level CSPs (see *Section 4*, *Microbial Contamination Risk Levels*) within the secure confines of the institution. This requires these institutions to be USP <797> compliant.
- These institutions will also administer all manufacturer pre-made, ready-to-use injectables within the secure confines of the institution.
- In addition, since the nature of their patient population requires injectable therapy more often than the lower-care level institutions, staff at Care Level 4 institutions are equipped

to assist other institutions with injectable therapy recommendations and questions. They may be called upon to assist with a variety of questions including, but not limited to, those regarding medication selection, dosing, compatibility, IV rates, and catheter devices.

Care Level 3 Institutions

- Care Level 3 facilities will prepare low-risk level CSPs within the secure confines of the institution. This requires these institutions to be USP <797> compliant.
- These institutions will administer injectable therapy within the secure confines of the institution for inmates who do not require 24-hour nursing care.

Care Level 1 and 2 Institutions

- Care Level 1 and 2 institutions will administer injectable therapy within the secure confines of the institution for inmates who do not require 24-hour nursing care. These institutions may stock manufacturer ready-to-use preparations; however, they are not required to compound sterile products or to be <797> compliant.
- Injectable therapy should be changed to manufacturer ready-to-use preparations whenever possible. When an alternative to CSP preparations does not exist, the institution is expected to obtain CSPs from other sources (see *Section 11, Supplies and Storage*) in order to provide necessary injectable therapy in-house.

Table 1. Summary of Goals by Care Level

Goals	Care Level			
	1	2	3	4
Compound medium-risk level preparations.				x
Compound low-risk level preparations.			x	x
Administer injectable preparations within the secure confines of the institution.	x	x	x	x
Create a cadre of individuals to place PICC lines.				x
Contract with local services to place PICC within secure confines of institution.	x	x	x	
Utilize ready-to-use injectable formulations whenever possible.	x	x	x	x
Assist institutions with questions on injectable therapy.				x
Documentation of off-site medication administration within BOP EHR medication profile.	x	x	x	x

3. Engineering Controls

USP <797> focuses on minimizing the risk of contamination of CSPs. Many of the standards are focused on reducing particulates in the air in the area where CSPs are compounded. Air quality standards are determined by the International Organization for Standardization (ISO). The ISO standards are shown in *Table 2* below. (These standards were formerly known by their Federal Standard classification, and those classifications are shown as well.)

Table 2. ISO Air Quality Standards

ISO Class	Former Federal Standard 209E	Particle Count/m^3 (particles are 0.5µm or larger)
5	Class 100	3,520
6	Class 1,000	35,200
7	Class 10,000	352,000
8	Class 100,000	3,520,000

USP <797> Compliant Institutions

Institution pharmacies that are USP <797> compliant will maintain Primary Engineering Controls (PEC) that provide an ISO Class 5 environment for compounding CSPs. *Laminar airflow workbenches* (LAWB), *biological safety cabinets* (BSC), *compounding aseptic isolators* (CAI), or *compounding aseptic containment isolators* (CACI) will provide an ISO Class 5 environment to meet this standard. CAIs and CACIs are sometimes referred to as "glove box hoods."

- Institutions using BSCs or LAWBs will locate the hoods in a *buffer room* (clean room) that conforms to ISO Class 7 conditions. The buffer room should be connected to an *ante room* conforming to ISO Class 7 or 8 conditions.
- Institutions using a CACI or CAI do not have to locate the hoods in buffer rooms; however, this equipment should be placed in an area that minimizes interruptions of staff working in the isolators. This location should have minimal pass-through traffic, be blocked off from the normal workflow of the pharmacy, and should not allow for distractions from personnel who are not directly involved with compounding.

Maintenance/Certification

All maintenance and certification of hoods, isolators, and rooms should be performed by qualified individuals.

BSC/LAWB/CAI/CACI - USP <797> guidelines require hoods and isolators to be inspected no less than every six months, and whenever the equipment is moved or major service is performed. In addition, the guidelines also state that antimicrobial testing must be conducted once a year.

Buffer and ante rooms must be certified no less than every six months, and whenever major service is performed. Certification includes antimicrobial testing, air exchanges, and particle testing.

4. Microbial Contamination Risk Levels

USP <797> defines three risk levels (low, medium, and high), based on the potential for bacterial contamination of CSPs. Below are some of the conditions commonly encountered in the BOP, with their associated level of risk for contamination. This list is not all-inclusive and does not include high-risk level CSPs. See USP <797> for a complete listing of all conditions determining low-, medium-, and high-risk levels.

Low-Risk Level

1. CSPs are compounded with aseptic manipulation within an ISO Class 5 or better air quality, using only sterile ingredients, products, components, and devices.
2. The compounding involves only transfer, measuring, and mixing manipulations with closed or sealed packaging systems that are performed promptly and attentively.
3. Not more than three commercially available sterile products, and not more than two entries in any one container (e.g., vial, bag), are used to prepare the CSP.
4. Manipulations are limited to aseptically opening ampules, penetrating sterile stoppers on vials with sterile needles, and transferring sterile liquids with sterile syringes to other sterile containers.
5. Storage periods of low-risk CSPs prior to administration cannot exceed:
   - 48 hours at controlled room temperature,
   - 14 days at refrigeration (between 2^{o}C and 8^{o}C), or
   - 45 days frozen (-20^{o}C or colder).

Examples of low-risk compounding include reconstitution of small-volume parenterals such as antibiotics, or preparation of hydration fluids. Low-risk compounding would also include drawing solution from an ampule through a sterile filter into a syringe.

Medium-Risk Level

CSPs compounded under low-risk level conditions (ISO Class 5) *with one or more of the following conditions* are considered to have a medium risk of contamination.

1. Multiple individual or small doses of sterile products are combined or pooled to prepare a CSP that will be administered either to multiple patients or to one patient on multiple occasions.
2. The compounding process includes complex aseptic manipulations other than single-volume transfer.
3. The compounding process requires a long duration, such as that required to complete dissolution or homogenous mixing.
4. The sterile CSPs do not contain broad-spectrum bacteriostatic substances, and they are administered over several days.
5. Storage periods of medium-risk CSPs prior to administration cannot exceed:
   - 30 hours at controlled room temperature,
   - 7 days at refrigeration (between 2^{o}C and 8^{o}C), or
   - 45 days frozen (-20^{o}C or colder).

Examples of medium-risk compounding include compounding total parenteral nutrition fluids, and transfer of solutions from multiple vials or ampules into one or more final sterile containers (i.e., batch compounding).

Immediate-Use Compounded Sterile Products

In cases of emergency, any institution may compound sterile products outside of a Class 5 environment. Emergency situations include the need for cardiopulmonary resuscitation, emergency treatment, or critical therapy where the time needed to compound a CSP under low-risk conditions would subject a patient to additional risk. Compounding of immediate-use products applies only to products that would otherwise be considered low-risk. Products prepared under the immediate use provision must be administered within one hour following the start of preparation of the CSP.

5. Beyond Use Dating

A *Beyond Use Date* (BUD) is the date and time after which a CSP cannot be stored or used for a patient. It is determined by when the preparation is compounded, not when it was manufactured, and should not be confused with the manufacturer expiration dating. Manufacturer expiration dating is established by the manufacturer and is no longer valid once the original package is opened by an end user (i.e., nurse, pharmacist, or other provider). After the original package is opened, the end user must establish how much longer the contents may be used before they must be disposed of. The end-user determines the BUD based on a combination of factors, including manufacturer labeling, compounding conditions, and storage conditions.

➔ Beyond Use Dates for CSPs that are produced under the *Immediate Use* provision may not have a date and time longer than one hour.

Compounded Sterile Products (CSPs)

Please see *Section 4*, *Microbial Contamination Risk Levels*, to determine BUDs for CSPs.

Proprietary Bag and Vial Systems

Proprietary bag and vial systems (e.g., ADD-Vantage®, Mini Bag Plus®, Add a Vial®, Add-Ease® products, and others) are not addressed in USP <797>. Manufacturer instructions for handling and storage should be followed when using these products.

Multi-Dose Vials

As long as an aseptic technique is utilized, multiple-dose vials may be used for up to 28 days after their initial use *or* until the date indicated on the manufacturer's labeling—*whichever comes first*. Once the vial is initially punctured, the new BUD must be placed on the vial, along with the initials of the individual who punctured the vial.

6. IV Pumps and Syringe Pumps

In order to reduce the risk of medication errors related to inappropriate IV flow rates, it is recommended that IV pumps be used when administering an IV fluid. For slow IV pushes, syringe pumps should be utilized.

7. IV Catheter Devices

IV catheters are used to access the bloodstream for IV administration of drugs. They are manufactured in a variety of sizes and lengths with each type meeting a different purpose. The types of catheters are listed below in *Table 3* and then discussed more fully.

➔ When choosing a catheter, the provider should select the catheter with the smallest gauge, shortest length, and fewest number of lumens—and is the least invasive to manage the prescribed therapy. Providers should consider treatment regimen, length of treatment, duration of dwell, and vascular integrity.

Table 3. Description of IV Catheter Devices

Short Peripheral Catheters (PIV)	The tip of a short peripheral intravenous catheter terminates in a peripheral vein with a length of less than 3 inches (8 cm). Size varies from 14–24 gauge and should be used for immediate IV access and therapy lasting less than 6 days.
Midline Catheters	These are peripheral venous access devices from 3–10 inches in length (8–25 cm). Midline catheters may be single or double lumen, and gauge sizes are 22–24. Midlines are usually placed in an upper arm vein such as the brachial or cephalic vein, and the tip ends below the level of the axillary line. Midlines are routinely used for 1–4 weeks and are NOT central lines.
Peripherally Inserted Central Catheters (PICC)	These catheters are ≥ 8 inches (20 cm) and are inserted into a peripheral vein with the tip terminating in the Superior Vena Cava.
Centrally Inserted Central Catheters (CVC)	These catheters are inserted in the central section of the body via the internal jugular, subclavian, or femoral vein, with the tip terminating in the vena cava.

Short Peripheral Catheters (PIV)

Short Peripheral Catheters may be used for trauma, surgery, blood transfusions, and general and intermittent transfusions.

Contraindications for PIV: Therapies that are not appropriate for PIV include continuous vesicant therapy, parenteral nutrition, and infusions with pH less than 5 or greater than 9, or osmolality greater than 600 mOsm/L.

Preventive measures to ensure safe and efficient use of PIV:

1. Hand hygiene: Observe proper hand hygiene procedures by washing hands with either conventional antiseptic-containing soap and water or waterless alcohol-based gels or foams. Observe hand hygiene before and after palpating catheter insertion sites, as well

as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter. Use of gloves does not obviate the need for hand hygiene.

2. Evaluate the site and dressing integrity daily. Do not routinely remove or change dressing. Replace dressing when the catheter is removed or replaced, or when the dressing becomes damp, loosened, or soiled. Replace dressing more frequently in diaphoretic patients.
3. Palpate through the dressing to identify any tenderness. In patients who have large bulky dressings that prevent palpation or direct visualization of the catheter insertion site, remove the dressing and visually inspect the catheter at least daily and apply a new dressing. Remove the catheter if signs of phlebitis or infection are present.
4. Replace no more than every 72–96 hours to reduce risk of infection and phlebitis.

   Note: *When adherence to aseptic technique cannot be ensured (i.e., when catheters are inserted during a medical emergency), replace all catheters as soon as possible within 48 hours.*
5. Replace intravenous tubing, including add-on devices, no more frequently than at 72 hour intervals unless clinically indicated.
6. Replace tubing used to administer blood, blood products, or lipid emulsions within 24 hours of initiating the infusion.

Midline Catheters

Indications for Midlines: Indications for Midline use include frequent IV restarts, limited access, and therapy that is expected to last 1–4 weeks.

Contraindications for Midlines: Therapies that are not appropriate for Midlines are continuous vesicant therapy where pH is less than 5 or greater than 9, or osmolality is greater than 600 mOsm/L.

Preventive measures to ensure safe and efficient use of Midlines: See *Appendix 4*.

Peripherally Inserted Central Catheters (PICC)

A PICC line insertion can be an inpatient or outpatient procedure and is performed by trained and qualified health care professionals such as radiologists, physician assistants, nurse practitioners, radiology assistants, or certified registered nurses. After the insertion, the PICC is secured to the skin with an adhesive anchoring device and dressed with a sterile dressing.

Care Level 4 institutions should create a cadre of individuals who are equipped and trained to insert these catheters within the secure confines of the institution.

Care Level 1, 2, and 3 institutions should contract or execute a purchase order with a local service to place peripherally inserted central catheters within the secure confines of the institution when possible.

Housing of inmates with PICC lines: Institutions should not change the housing status of an inmate solely due to the placement of a PICC line (e.g., an inmate in general population should remain in general population). Health Services is expected to check the

line on a daily basis. If tampering is evident, appropriate disciplinary action should be taken in consultation with correctional services.

Indications for PICC use in the BOP:

1. Use with IV therapy of duration greater than 1 week, and with continuous vesicant therapy where pH is less than 5 or greater than 9 or osmolality is greater than 600 mOsm/L.
2. *Long-term drug/chemotherapy:* The PICC line is ideal for this purpose and can be used for a few weeks or months, and up to one year with proper care, before it is discontinued. The PICC line can be used for both short infusions and continuous infusions of chemotherapeutic or caustic medications.
3. *Hyperalimentation:* PICCs seem to provide a reliable means for administration of hyperalimentation, especially for long-term use.
4. *Administration of blood or blood products:* Patients with blood disorders such as anemia, low platelet counts, or coagulation disorders may require repeated blood or blood products. PICC lines can serve this purpose as they can stay for a longer time, thereby avoiding repeated catheter insertion. In addition, most have large-gauge lumens that are necessary to accommodate blood administration.
5. *Measurement of central venous pressure*, within appropriate Levels of Care only (e.g., CL4 institution)
6. *Short term infusion:* PICCs are also indicated for short-term infusions for patients with limited venous access. In fact, PICCs may be used for any infusion, regardless of osmolality, pH, or other chemical properties of the solution or medication.
7. *In poor candidates for surgery/anesthesia:* PICCs are indicated in poor candidates for a surgical procedure and/or the anesthesia required for placement of a tunneled central venous access device.

Contraindications of PICC use:

1. *Upper extremity/subclavian thrombosis:* The presence of upper extremity or subclavian thrombosis is a contraindication for bedside PICC insertion. These patients may be referred to interventional radiology to have a PICC inserted under fluoroscopy.
2. *Chronic renal failure/end-stage renal disease:* The need to preserve peripheral veins for future dialysis fistulas is a critical issue for these patients. Insertion of any catheter in the upper extremity or the subclavian veins can cause thrombus formation and scarring that could reduce the probability for successful fistula development.
3. *Skin infection:* In all attempts to reduce central line infections, a line should not be placed at or near the site of a skin infection.
4. *Hematological derangements:* Contraindications include thrombocytopenia; platelet count of less than 20,000; coagulopathy; INR of 2.5 or greater; sepsis; or bacteremia.
5. *Radical mastectomy:* When node removal is involved, the side of a mastectomy should not be utilized. (If the patient has an existing fistula or other contraindication, the physician may order use of the arm.)
6. *"Frequent" intermittent access or for blood sampling:* Because a PICC is very long and thin, it is not advisable to insert it "solely" for the purpose of obtaining blood for

laboratory analysis. Each blood draw increases the risk of occluding the catheter. A risk-benefit analysis should be done to determine the value of using a PICC for drawing blood. The manufacturer's directions for use should be consulted carefully when making this decision.

Preventive measures to ensure safe and efficient use of PICC: See *Appendix 4*.

Centrally Inserted Central Catheters (CVC)

Centrally inserted central catheters are inserted into the internal jugular, subclavian, or femoral vein by direct venipuncture, and terminate in a central vein such as the Superior or Inferior Vena Cava. There are three types of CVC—non-tunneled, tunneled, and implanted port. CVCs are inserted by a physician, radiologist, nurse practitioner, or physician assistant at a location with adequate medical support.

Preventive measures to ensure safe and efficient use of central vascular access devices (PICC, CVC) and Midline catheters: See *Appendix 4*.

Documentation of IV Catheter Placement

- Once the IV is established, documentation must include the date, time, and venipuncture site, together with a description of the equipment used—such as the type and gauge/size of the catheter or needle. Documentation should also include the specific amount of blood return, as well as how the patient tolerated the procedure, the number of attempts, and any patient education or teaching provided.
- Update the documentation record each time the insertion site, venipuncture device, or IV tubing is changed. Also document any reason for changing the IV site such as phlebitis, occlusion, patient removal, or routine change according to facility policy.
- When documenting patients with a PICC, note the length of the catheter exposed, circumference of the arm, and if the injection cap was changed.
- When the IV is discontinued, documentation must include the date and time the venipuncture site was removed and the patient education/teaching provided.

8. Blood Stream Infections

When utilizing catheters, providers should be vigilant and maintain proper maintenance and care to minimize the risk of Catheter-Related Blood Stream Infections (CRBSI). Although blood stream infections do not independently increase mortality, they do increase healthcare costs and the length of inpatient hospital stay.

There are four recognized routes for contamination of catheters:

1. Migration of skin organisms at the insertion site into the cutaneous catheter tract and along the surface of the catheter, with colonization of the catheter tip, can occur; *this is the most common route of infection for short-term catheters*.

2. Direct contamination of the catheter or catheter hub can occur by contact with hands or contaminated fluids or devices.
3. Less commonly, catheters might become hematogenously seeded from another focus of infection.
4. Rarely, infusate contamination might lead to catheter-related bloodstream infections.

In order to reduce the incidence of these infections, a multidisciplinary effort must be employed. Individuals to be involved should include healthcare professionals who order the insertion and removal of CVCs, personnel who insert and maintain intravascular catheters, infection control officers, administrators, and patients.

9. Competencies and Training

Staff preparing and administering injectable medications require a range of competencies to ensure safe and effective therapy. Competencies may be obtained through a variety of means; training should take place initially and annually thereafter. Topics that should be covered include:

For Physicians and Mid-Level Practioners (MLPs)

- Proper catheter device selection
- Vein selection and catheter insertion
- Placement of catheter device confirmation

For Nurses and MLPs

- Proper catheter device selection
- Vein selection and catheter insertion
- Dressing change/maintenance
- IV tubing needs/requirements
- IV pump, syringe pump
- Use of infusion pump (competency with the specific pump used by the facility)
- IV compatibilities
- IV flow rates
- Compounding sterile products
- Discontinuation and removal of intravenous catheter devices

For Pharmacy

- USP <797> requirements for compounding sterile products (pharmacists and pharmacy technicians)
- Pharmaceutical calculations (pharmacists and pharmacy technicians)
- Compounding sterile products (pharmacists and pharmacy technicians)

- Media fill and fingertip testing— required once a year for staff performing compounding activities in a LAWB or BSC
- Storage requirements—before and after preparation (pharmacists and pharmacy technicians)
- IV flow rates (pharmacists)
- Immunization training (pharmacists)

10. Training Sources/Additional Information

There are several training resources available to institutions including:

- Medical Referral Centers (MRCs)
- Professional organizations
- Independent nursing services that provide PICC line educational/consulting services
- Manufacturers that provide education for utilizing their products
- Local hospitals

Providers needing additional information regarding the preparation of injectable medications may refer to the following sources:

- Medical Referral Centers (MRCs) have numerous staff who are very familiar with a variety of intravenous products, methods, and standards. In particular, MRC pharmacists should be considered as resources for questions that arise both before and during compounding activities (FMC Butner has extended hours).
- Gahart BL, Nazareno AR. *Intravenous Medications: A Handbook for Nurses and Health Professionals*. 27th ed. St. Louis, MO: Elsevier Mosby, 2011.
- Trissel LA. *Trissel's Stability of Compounded Formulations*. 4th ed. Washington, DC: American Pharmacists Association, 2009.
- United States Pharmacopeia at http://www.usp.org.
- American Society of Health-System Pharmacists (ASHP) at http://www.ashp.org.
- *Compounding Sterile Preparations: ASHP's Video Guide to Chapter <797>* available from ASHP's online store at http://store.ashp.org/Default.aspx?TabId=195&ProductId=6320

11. Supplies and Storage

Institutions providing injectable therapy should have the following basic supplies:

- **IV/syringe pumps** – There are several available on the market. Staff should demonstrate competency prior to using.
- **Tubing** – Not all pumps are compatible with all tubing. In addition, medications may be incompatible with particular types of tubing.

- **Medications** – Whenever possible, ready-to-use medications should be purchased. Ready-to-use medications include manufacturer pre-made infusion bags, frozen IVs, and proprietary bag and vial systems. Frozen IVs are limited to high volume facilities due to the requirement that bags be stored in ultra-cold freezers (-20 F^{o}). Proprietary bag and vial systems (Vial-mate Adapter®, Minibag Plus®, ADD-Vantage®, and others) are easy to manipulate and designed for immediate bedside use, and sterile compounding is not required.
- **Catheter and related supplies –** These supplies may be obtained from a variety of sources, including prime vendors, contract home infusion companies, and local hospitals. Whenever possible, supplies should be purchased from prime vendors.
- **Alternate sources for supplies/services –** Contracts with home infusion companies are an option for medications that must be compounded and cannot be purchased in ready-to-use forms. These companies can also supply pumps and compatible tubing and, in many cases, will provide competency training for providers. If such companies are used, institutions should have a contract in place for all the necessary services (may be part of comprehensive hospital services contract). **Care Level 3 and 4 institutions should not be utilizing this method.** It is recommended the contract be structured such that the necessary medications can be purchased by the government, with the contractor compounding the medications and charging a "mixing" fee for preparing the IV admixture.

  Local hospitals should be utilized as a last resort for medications, unless they are part of a home infusion contract, due to the inability to obtain competitive pricing.

  A nursing service that provides onsite PICC line insertions may be contracted to place PICC lines within the secure confines of the institution.

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Appendix 1: Checklist for IV Administration

- ☐ **Ensure necessary equipment is on hand:**
  - ☐ IV pump (may be leased from home infusion company or hospital)
  - ☐ Catheter supplies

- ☐ **Ensure staff are competent in these areas:**
  - ☐ IV pumps (may obtain training from pump manufacturers or home infusion vendors)
  - ☐ Catheter care (may obtain training from MRC, home infusion vendors, or local hospitals)
  - ☐ CL 3 & 4 pharmacies – compounding sterile preparations (may obtain training from MRCs, local hospitals, or ASHP)
  - ☐ CL 4 nurses, MLPs – PICC line placement

- ☐ **Ensure IV Medication Order is written:**
  - ☐ Conversion to formulary agent, if clinically appropriate
  - ☐ Non-formulary request completed and approved (prior to return from hospital, if possible)
  - ☐ Medication appropriately reflected in electronic Medical Record medication profile
  - ☐ Administration documented on electronic Medication Administration Record

- ☐ **Procure medication from pharmaceutical prime vendor:***
  - ☐ Utilize pre-filled bags, or proprietary bag and vial systems, whenever possible.
  - ☐ CL 1 & 2 – contract with home infusion vendor to provide compounded sterile products

  ***** *CL1 facilities should coordinate procurement through Central Processing/Fill Pharmacy*.

- ☐ **Ensure inmate has IV access:**
  - ☐ PICC Lines (if required)
    - ☐ CL 4 staff should place in-house
    - ☐ CL 1, 2, 3 – contract with home infusion service or independent nursing service to insert

- ☐ **Ensure custody is informed and any security issues are resolved.**

Appendix 2: Vascular Device Care Reference Guide

Catheter Type	Dressing Change	Flush*	Blood Draws*	Special Instructions
Peripheral Line (PIV)	Change every 3 days with site change.	• Flush with 3 mL Normal Saline pre- and post-medication administration. • Flush every 8 hours when not running a continuous infusion.	Blood sampling should not be drawn after the initial insertion.	***For blood transfusion, use a 20 gauge or larger catheter.***
Midline Catheter	Change every 7 days or when soiled, using sterile technique: • transparent dressing (including bio patch & self-adhesive anchoring device, when present) • end caps	• Aspirate for blood return before flushing. • Flush pre- and post-medication administration, with 10 mL of Normal Saline, locking with 5 mL Heparin Flush 100 units/mL. • Flush as above once daily when not in use,	Blood sampling should not be drawn after the initial insertion.	***This is not a central line.*** ***Vesicant drugs should not be infused.***
Peripherally Inserted Central Catheter (PICC)	Change every 7 days or when soiled, using sterile technique: • transparent dressing (including bio patch & self-adhesive anchoring device, when present) • end caps *NOTE: Dressing change is not required 24 hours after initial insertion unless the dressing is soiled.*	**Clamped Catheter:** • Aspirate for blood return before flushing. • Flush pre- and post-medication administration, with 10 mL of Normal Saline, locking with 5 mL Heparin Flush 100 units/mL. • Flush as above once daily when not in use. • ***Use only 10 mL syringe.*** **Non-Clamped Catheters:** • Before flushing, slowly aspirate and allow internal valve to open, then check for blood return. • Flush pre- and post-medication administration, with 10 mL of Normal Saline. • Flush as above weekly when not in use. • ***Use only 10 mL syringe.***	• Draw off 5 mL of blood and discard prior to lab sample. • After sampling, flush with 20 mL of Normal Saline, using the *push pause technique***. • For non-clamped catheters, aspirate and allow internal valve to open. • ***End cap should be changed after blood samplings.***	• ***Use only 10 mL or larger syringes.*** (Smaller syringes create higher pressure that can potentially rupture device). • If catheter has migrated out, ***do not push in***. All content under dressing is ***sterile***. • 2% aqueous chlorhexidine gluconate should be used to clean site. • Monitor the site daily for dressing integrity and site tenderness, as well as need for central line. • ***Flushing is key to maintaining patency of the line.*** • ***End caps must be cleaned vigorously with proper antisepsis.***
Centrally Inserted Central Catheter (CVC)	Change every 7 days or when soiled, using sterile technique: • transparent dressing (including bio patch & self-adhesive anchoring device, when present) • end caps	• Aspirate for blood return before flushing. • Flush pre- and post-medication administration, with 10 mL of Normal Saline. • Flush as above every 12 hours when not in use. • ***Use only 10 mL syringe.***	• Draw off 5 ml of blood and discard prior to lab sample. • After sampling, flush with 20 ml of Normal Saline, using the *push pause* technique**. • ***End cap should be changed after blood samplings.***	***See PICC special instructions above, which apply to all central line devices.***

(Appendix 2 continues on next page. See NOTES that follow.)

Catheter Type	Dressing Change	Flush*	Blood Draws*	Special Instructions
(continued from previous page)				
Tunneled Central Line with Open-Ended Tip Dialysis Catheter	Change every 7 days or when soiled, using sterile technique: • transparent dressing (including bio patch & self-adhesive anchoring device, when present) • end caps *Well healed sites do not require dressings, but may be dressed for patient comfort.*	• Aspirate for blood return before flushing. • Flush pre- and post-medication administration, with 10 mL of Normal Saline, locking with 3 mL Heparin Flush 100 units/mL. • Flush as above once daily when not in use. **GROSHONG®:** • **F**lush as above, but Heparin Lock is not required.	• Draw off 5 mL of blood and discard prior to lab sample. • After sampling, flush with 20 mL of Normal Saline, using the *push pause technique***. • ***For non-clamped catheters***, aspirate and allow internal valve to open. • ***End cap should be changed after blood samplings.***	***See PICC special instructions above, which apply to all central line devices.***
Implanted Port	• No dressing unless accessed. • If accessed, change weekly with needle change, or sooner if soiled.	• Aspirate for blood return before flushing. • Flush pre- and post-medication administration, with 10 mL of Normal Saline, locking with 5 mL Heparin Flush 100 units/mL (through extension set). • Flush as above monthly when port is not in use. • ***Dual ports require both ports to be flushed as above.***	• Draw off 5 mL of blood and discard prior to lab sample. • After sampling, flush with 20 mL Normal Saline* using the *push pause technique***.	• ***Use only 10 mL or larger syringes.*** (Smaller syringes create higher pressure that can potentially rupture device). • ***Use only Huber non-coring needles to access ports.*** • Power Port may be used for power infusions (CT scan), but special power port huber needle is required.

NOTES:

* **Normal Saline** used for flushes should be preservative-free Normal Saline.

** **Push pause technique** requires several intervals of pushing and pausing throughout the flush. This creates a turbulence within the catheter that prevents precipitates within the catheter, thereby maintaining regular flow.

➔ ***If the catheter becomes "sluggish" or difficult to flush, it must be reported immediately so that the device may be declotted by a trained individual. It is important to maintain patency of the device.***

From: Infusion Nurses Society. *Policies and Procedures for Infusion Nursing*. 4th ed. Norwood, MA: Infusion Nurses Society; 2011.

Appendix 3: Short Peripheral Catheter Access Procedure Guide

Equipment:

- ☐ tourniquet (non-latex preferred)
- ☐ disposable gloves (non-latex)
- ☐ antiseptic swab (preferably chlorhexidine)
- ☐ IV solution
- ☐ IV tubing
- ☐ tape
- ☐ transparent/occlusive dressing
- ☐ IV pole
- ☐ IV pump
- ☐ IV catheter
- ☐ Normal Saline
- ☐ 3mL syringe

Procedure (20 steps):

☐ **1.** Obtain order from the physician.

☐ **2.** Assemble needed equipment (see list above).

☐ **3.** Confirm patient's identity, utilizing name and number. Explain the procedure to the patient.

☐ **4.** Proper Hand hygiene techniques (washing hands with soap and water). Put on gloves (do not remove index finger portion of glove).

☐ **5.** Select a venipuncture site. Start with vein at the most distal site so that you can move proximally as needed for subsequent IV insertion sites. Apply a tourniquet 2–6 inches above the desired insertion site.

☐ **6.** Clean the venipuncture site with chlorhexidine for a minimum of 30 seconds, and allow to air dry.

☐ **7.** Using the thumb of your non-dominant hand, stretch the skin taut below the puncture site to stabilize the vein.

☐ **8.** Insert the IV catheter, bevel up, through the skin at a 15–25 degree angle. Use a slow, continuous motion.

☐ **9.** When the vein is entered, lower the catheter to skin level.

☐ **10.** When inserting, always hold the catheter by the clear plastic flashback chamber— NOT by the colored hub.

☐ **11.** Advance the catheter approximately ¼ to ½ inch into the vein.

☐ **12.** Pull back on needle to separate needle from catheter about ¼ inch, and advance the catheter into the vein.

☐ **13.** If resistance is met while attempting to thread the catheter: STOP, release the tourniquet, and carefully remove both the needle and the catheter. Attempt another venipuncture with a NEW catheter. (If equipment is not available, remove gloves, gather equipment, perform proper hand hygiene, and apply new gloves).

☐ **14.** Apply pressure on the vein beyond the catheter tip with your little finger; release the tourniquet, and slowly remove the needle while holding the catheter hub in place.

☐ **15.** *If site is to be used for continuous infusion:* Attach the pre-primed tubing, and adjust infusion flow to the prescribed rate.

☐ **16.** *If site is to be utilized for intermittent therapy:* Attach the Infusion Plug and flush access with 3mL of Normal Saline.

☐ **17.** Secure the venous access device with a 2-inch strip of ½ inch tape, utilizing either the Chevron or U taping method.

☐ **18.** Apply a transparent dressing to the site. Label the dressing with the date, provider's initials, and time of insertion.

☐ **19.** Remove gloves, preform Hand hygiene.

☐ **20.** Peripheral IV sites are to be changed every 72 hours, unless there is an order from the Licensed Independent Practitioner/Mid-Level Practitioner to the contrary. *Do not remove the old IV catheter until a new IV access catheter has been successfully started.*

IV dressings should also be changed if clinically indicated (i.e., signs and symtoms of phebilits, and/or patient complains of pain, burning, or irritation at the site).

Notes:

- Once the IV is obtained, observe and document the specific amount of blood returned.
- When choosing a catheter, select the catheter with the smallest gauge, shortest length, and fewest number of lumens—and that is the least invasive to manage the prescribed therapy. Providers should consider treatment regimen, length of treatment, duration of dwell, and vascular integrity.

Appendix 4: Preventive Measures for Safe and Efficient Use of Catheter Devices—PICCs, CVCs, and Midline Catheters

Various interventions have been used in order to reduce the incidence of blood stream infections and other complications. These include:

- Perform proper hand hygiene techniques (washing with soap and water).
- Skin antisepsis:
  - 70% alcohol, tincture of iodine, or alcoholic chlorhexidine gluconate for short peripheral catheter insertions
  - 2% aqueous chlorhexidine gluconate for catheters such as the Midline, PICC, and CVC
- Avoid using the femoral vein for central venous access; make use of the subclavian site, rather than the jugular or femoral for non-tunneled CVC placement.
- Promptly remove all intravascular catheters that are no longer needed.
- Use maximal sterile barrier precautions during insertion and strict aseptic technique with care and maintenance.
- To prevent catheter-related infections, do not routinely replace CVC, PICC, and Midlines.
- A sutureless securement device should be used to preserve skin integrity and reduce risks of infection.
- Use sterile gauze or sterile, transparent, semipermeable dressing to cover the site. Use Bio Patch or other antimicrobial dressings. Replace dressing if it becomes damp, loosened, or visibly soiled—and every 7 days routinely.
- Monitor the site daily for dressing integrity and site tenderness.
- If catheter migrates out, DO NOT push it back in.
- Do not submerge catheter or site in water. Protect site prior to shower or bathing.
- Use ultrasound guidance to place central venous catheters in order to reduce the number of cannulation attempts and mechanical complications.
- Closely monitor the patient's vital signs for fever, which may indicate infection.
- Encourage the inmate to report any changes in the site, such as discomfort.

Appendix 5: Procedure for Changing Sterile Dressings for PICCs

Equipment:

- ☐ 1 pair non-sterile gloves
- ☐ 1 pair sterile gloves
- ☐ 2 masks (one for staff & one for patient)
- ☐ 1 roll of transparent tape
- ☐ 1 transparent dressing (e.g., 10 cm x 12 cm)
- ☐ tape measure
- ☐ central line site care kit
- ☐ chlorhexidine swab *(if not contained in central line kit)*
- ☐ chlorhexidine-impregnated sponge *(optional CDC recommendation to maximize avoidance of infection beyond basic measures)*
- ☐ sutureless catheter stabilization (securement) device

Procedure (19 steps):

☐ **1.** Explain the procedure to the patient. Ask whether he or she has allergies to any of the solutions being used to clean the site.

Recommended positioning of the patient: Supine, with the arm extended away from the trunk at a 45^{o} angle, and the insertion site below the level of the heart.

☐ **2.** Perform proper hand hygiene, apply non-sterile gloves, and mask yourself and the patient. Ask the patient to turn his or her face away from the PICC line site.

☐ **3.** Apply a piece of tape to the extension tubing to help secure the catheter when the dressing is removed.

☐ **4.** Begin removing the transparent dressing at the most distal portion. The chlorhexidine-impregnated sponge should be attached to the transparent dressing and should come off the skin at this time.

☐ **5.** Inspect the insertion site for signs of infection. If purulent drainage is present, notify the patient's MD or MLP and obtain a culture.

☐ **6.** Remove non-sterile gloves, wash your hands, and apply sterile gloves.

Note: If the chlorhexidine-impregnated sponge was not removed in step 4, it should now be removed *after* the sterile gloves have been put on.

☐ **7.** Clean the entire insertion site in a back-and-forth, up-and-down motion with the chlorhexidine prep swab, (provided in the kit) for 30 seconds. Be sure to use some friction when cleaning the site. Allow the area to dry; do not wipe solution off. Do NOT touch the cleaned area.

☐ **8.** Position the catheter so it will not kink when the arm is bent. The lumen(s) should be positioned away from the body.

Recommendation: Do not tape the exposed catheter in a straight line; this causes the catheter to pull out.

☐ **9.** Secure the catheter hub and wings with 2–3 steri-strips.

☐ **10.** Place the chlorhexidine-impregnated sponge at the PICC insertion site. Place the patch slit towards the lumen for easy removal.

☐ **11.** Apply transparent dressing over the insertion site.

Note: Never place the catheter between two pieces of dressing material—it makes future dressing changes difficult and increases the risk of infection. Apply gauze only if bleeding is noted.

☐ **12.** Apply the sutureless catheter stabilization device around each lumen hub, and secure it to the first transparent dressing.

☐ **13.** Remove the tape that was used to secure the extension tubing during the dressing change.

☐ **14.** Measure the length of the catheter from insertion site to the base of the plastic hub. Compare this measurement to the measurement at the time of insertion. Notify MD or MLP if there is a difference of 2 cm or greater.

☐ **15.** Make sure that the catheter and occlusive dressing are secured. If they are not secured, the back-and-forth motion of the catheter in the vein will increase the risk for infection.

☐ **16.** Measure the circumference of the arm at a point of 10 cm proximal to the insertion site.

☐ **17.** Compare this measurement with the measurement at the time of insertion. Notify MD or MLP if there is a difference of 5 cm or greater from the original measurement.

☐ **18.** Label the dressing with the date, time, and initials of the nurse.

☐ **19**. Remove gloves, perform hand hygiene.

Appendix 6: Common Injectable Medication Notes

The following tables serve as a quick guide for Care Level 1 and Care Level 2 institutions regarding appropriate injectable medications that should be administered on site.

➔ *The information provided in this table is not all-inclusive and should only be used as a guide. See the listings under References, or the respective package insert, for additional information and patient-specific dosing.*

For injectable medications that are not on this list or for additional information for those medications listed, providers should consult an MRC Pharmacist, drug information literature, and medication package inserts. MRC pharmacists should also be consulted when considering potential therapy conversion and dosing options appropriate for the ambulatory setting. Injectable medications should only be utilized when deemed to be clinically necessary and IV-to-oral conversion is not an option.

Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
Abatacept IV (Orencia)	125mg 250mg	IV, SQ	30 min	NS	PFS	Yes
					- Use 0.2 –1.2 micron low-protein binding filter & silicone-free syringes & needles - Do not shake - PFS is only for SQ and vial is only for IV infusion - Infusion must be complete within 24 hrs from reconstitution - Protect from light	
Acyclovir (Zovirax)	500mg 1000mg	IV	60 min	Any		No
					- Max concentration of 7mg/ mL - Dilute reconstituted vial within 12 hrs; infuse within 24 hrs of final dilution	
Adalimumab (Humira)	40mg/0.8mL	SQ			PFS	Yes
					- Rotate site - Do not shake - Protect from light	
Ampicillin	250mg 500mg 1g 2g	P, IV, IM	*IVP:* 125-500mg: 3-5 min 1-2g: 10-15 min *IV:* 15 min	NS	Bag & vial system	Only after mixing
					- Rapid infusions may cause seizures; do not exceed 100mg/min - Use within 1 hr of preparing - Inject IM into large muscle (i.e., thigh or gluteal)	
Ampicillin/Sulbactam (Unasyn)	1.5g 3g	IV, P, IM	*IVP:* 10-15 min *IV:* 15-30 min	NS	Piggyback vial, bag & vial system	Only after mixing
					- IM injection use 0.5% to 2% lidocaine HCl for injection - Rapid infusions may cause seizures - Use within 1 hr of preparation - Inject IM into large muscle (i.e., thigh or gluteal)	
Antihemophilic Fac VIII (Koate-DVI)	Med (~500) High (~1000)	IV	5-10 min	Mfg diluent only		Yes
					- Use within 3 hours of reconstitution	
Azithromycin (Zithromax)	500mg	IV	1mg/ mL - 3 hrs 2mg/ mL - 1 hr	Any	Bag & vial system	Only after mixing
Benztropine (Cogentin)	1mg/mL	IM, P				No
					- IVP is rarely required - Incompatible with haloperidol or lorazepam	
Calcitonin Salmon, 2mL (Miacalcin)	200 IU/mL	IM, SQ		NS		Yes
					- SQ preferred unless volume exceeds 2mL, then use IM	

IV = Intravenous, P = Push, IM = Intramuscular, SQ = Subcutaneous, C = Central, PFS = prefilled syringe, RT = Room Temperature

Ready to Use? Medications do not need to be compounded when purchased in one of these formulations.

Compatibility: NS = Sodium Chloride 0.9%, D5W = Dextrose 5%, LR = Lactated Ringer's, SWFI = Sterile Water for Injection

Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
Cefazolin (Ancef)	500mg 1g 1g/50mL 10g	IM, P, IV	*IVP:* 5 min *IV:* 30-60 min	Any	Bag & vial system; Premix bag (1g/50mL in dextrose)	Only after mixing
					- Protect from light - Inject IM in large muscle (i.e., thigh or gluteal)	
Cefepime (Maxipime)	1g 2g	IM, P, IV	*IVP:* 5 min *IV:* 30 min	Any		Only after mixing
					- Protect from light - Inject IM in large muscle (i.e. thigh or gluteal)	
Cefotaxime sodium (Claforan)	500mg 1g 2g	IM, P, IV	*IVP:* 3-5 min *IV:* 20-60 min	Any	Bag & vial system	Only after mixing
					- Inject IM in large muscle (i.e., thigh or gluteal)	
Cefoxitin sodium (Mefoxin)	1g 2g	IM, P, IV	*IVP:* 3- 5 min *IV:* 10-60 min	Any	Premix bag	Only after mixing
					- Inject IM in large muscle (i.e., thigh or gluteal)	
Ceftazidime (Fortaz, Tazicef)	1g 2g	IM, P, IV	*IVP:* 3-5 min *IV:* 15-30 min	Any	Bag & vial system	Only after mixing
cefTRIaxONE (Rocephin)	500mg 1g 2g	IM, IV	*IV:* 30 min	D5W, NS	Premix bag, Bag & vial system	Only after mixing
					- Do not reconstitute or co-administer with calcium containing agents - IV concentrations of 10mg/mL – 40mg/mL are preferred - Inject IM in large muscle (i.e., thigh or gluteal)	
Cefuroxime (Ceftin)	750mg 1000mg	IM, P, IV	*IVP:* 3-5 min *IV:* 15-30 min	Any	Bag & vial system	Only after mixing
					- Inject IM in large muscle (i.e., thigh or gluteal)	
Ciprofloxacin (Cipro)	10mg/mL 400mg/200mL 200mg/100mL	IV	60 min	Any	Premix bag	No
					- Infuse into large vein - Protect from light	
Clindamycin (Cleocin)	300mg 600mg 900mg 300/50mL 600/50mL 900/50mL	IM, IV	10-60 min	Any	Premix bag, Bag & vial system	Only after mixing
					- Do not exceed 600mg in single IM dose - Final concentration should not exceed 18mg/ mL - IV max infusion rate 30mg/ min, no more than 1200mg/hr	
Daptomycin (Cubicin)	500mg	IV	*IV:* 30 min	NS, LR		Yes
					- Do not use with ReadyMED® infusion pumps, due to an impurity leaching from the pump system into the solution	

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Ready to Use? Medications do not need to be compounded when purchased in one of these formulations.

Compatibility: NS = Sodium Chloride 0.9%, D5W = Dextrose 5%, LR = Lactated Ringer's, SWFI = Sterile Water for Injection

Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
Darbepoetin Alfa (Aranesp)	25mcg 40mcg 60mcg 100mcg 150mcg 200mcg 300mcg 500mcg	SQ, P, IV		Do not dilute	PFS	Yes
					- IV recommended with dialysis patients - Do not shake - Protect from light	
Deferoxamine mesylate (Desferal)	500mg 2g	SQ, IV, IM	*IV max:* 15mg/kg/hr	Any		No
					- IV administration is preferred for severe toxicity - Monitor vital signs, epinephrine, an antihistamine, and resuscitation equipment should be readily available in case of an anaphylactic reaction	
Depo Estradiol Cypionate (Depo-Estradiol)	5mg/mL	IM				No
					- Inject into outer quadrant of gluteal muscle	
Desmopressin acetate (DDAVP)	4mcg/mL	IM, P, IV, SQ	*IVP:* 1 min *IV:* 15-30 min	NS		Yes
Dex 5% 1/2 NS w/ KCl 1000 mL Inj	10 mEq 20mEq 40mEq	IV	Max rate 10mEq/hr			No
					- If infusion rate >10 mEq/hr is needed, infuse via central line to minimize infusion related burning and phlebitis, and use continuous cardiac monitoring to monitor for signs of hyperkalemia. Maximum rate of 20mEq/hr	
Dex 5% NS w/ KCl 1000mL	20mEq	IV	Max rate 10mEq/hr			No
					- If infusion rate >10 mEq/hr is needed, infuse via central line to minimize infusion related burning and phlebitis, and use continuous cardiac monitoring to monitor for signs of hyperkalemia. Maximum rate of 20mEq/hr	
Dexamethasone sodium phosphate (Decadron)	4mg/mL 10mg/mL	IM, P, IV	*IV:* 5-10 min	NS, D5W		No
					- Protect from light - For doses > 10mg, minimum infusion time is at least 10 minutes - 4mg/mL for IVP or IM; 24mg/ML for IV only - IM injection into gluteal muscle	
Dicyclomine (Bentyl)	10mg/mL	IM		None needed		No
					- Protect from light	
Dihydroergotamine (D.H.E)	1mg/mL	IM, SQ, P	*IVP:* 2-3 min			No
					- To reduce risk of severe side effects, give antiemetic with administration - Protect from light	

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Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
DiphenhydrAMINE (Benadryl)	50mg/mL	IM, P, IV	*IV:* 10-15 min Max rate of 25mg/min	Any	Syringe	No
					-Protect from light -Inject IM in large muscle (i.e., thigh or gluteal)	
Enfuvirtide (Fuzeon)	90mg	SQ		Reconstitute with SWFI	Injection kit	Only after mixing
					- Rotate site	
Enoxaparin (Lovenox)	150mg/ 1mL 120mg/ 0.8mL 100mg/ 1mL 60mg/ 0.6mL 40mg/ 0.4mL 30mg/ 0.3mL 80mg/ 0.8mL *Multidose:* 300mg/ 3mL	SQ, P		D5W, NS	PFS	No
					- IV as part of treatment for ST-elevation myocardial infarction (STEMI) only in patients <75 years of age or during PCI	
Epoetin Alfa (Procrit)	*Units:* 2000 3000 4000 10,000 20,000 40,000	SQ, P, IV				Yes
					- SubQ preferred except in hemodialysis patients (IV preferred) - Do not shake - Protect from light	
Ertapenem (Invanz)	1g	IM, IV	30 min	NS	Bag & vial system	No
					- Max 7 days for IM administration - Inject IM in large muscle (i.e., thigh or gluteal) - Use IM preparation within 1 hour of reconstitution and IV within 6 hours of reconstitution	
Erythromycin lactobionate (Erythrocin)	500mg 1g	IV	20-60 min	NS	Bag & vial system	Yes
Estradiol valerate (Delestrogen)	10mg/mL 20mg/mL 40mg/mL	IM				No
					- Inject into the upper outer quadrant of the gluteal muscle	
Etanercept (Enbrel)	25mg 50mg	SQ			PFS, Kit	Yes, RT to inject
					- Rotate injection site - Do not shake	

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Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
Exenatide (Byetta)	10mcg/ 0.04mL 5mcg/ 0.02mL	SQ			PFS	Yes
Famotidine (Pepcid)	20mg/ 2mL 20mg/ 50mL	P, IV	*IVP:* 2 min *IV:* 15-30 min	Any	Premix bag	Yes
Ferric gluconate (Ferrlecit)	62.5mg/ 5mL	IV, P	*IV (undiluted):* ≤12.5mg/min *IV (diluted):* 1 hr	NS		No
					- Dose > 125 mg are associated with increased adverse events	
Filgrastim (Neupogen)	480mcg/ 0.8mL 480mcg/ 1.6mL 300mcg/mL 300mcg/ 0.5mL	SQ, P, IV	*IV:* 15-30 min	D5W	PFS	Yes
					- Do not give 24 hours prior or 24 hours after giving cytotoxic chemotherapy -Do not shake	
Fluconazole Premix (Diflucan)	100mg 200mg 400mg	IV	1-2 hrs	Any	Premix bag	No
					- Do not exceed 200 mg/ hr	
Fluphenazine HCl (Prolixin)	2.5mg/mL	IM				No
					- Watch for hypotension when giving IM - Protect from light - Inject into upper outer quadrant of gluteal muscle	
Fluphenazine decanoate (Prolixin Dec)	25mg/mL	IM, SQ				No
					- Watch for hypotension when giving IM - Protect from light - IM injection into upper outer quadrant of gluteal muscle	
Folic acid (Folacin-800)	5mg/mL	IM, IV, SQ	For doses ≤ 5mg: *Undiluted:* ≥ 1 min *Diluted:* 30 min	D5W, NS		No
Foscarnet sodium (Foscavir)	24mg/mL	IV	*Induction:* 1 hr *Maintenance:* 2 hrs	NS, D5W	Infusion bottle	No
					- Max rate 1mg/ kg/ min - Infusion pump required - Patient should be hydrated via IV infusion prior to infusing medication (see manufacturer labeling) - For peripheral vein infusion max concentration is 12mg/mL	
Furosemide (Lasix)	10mg/mL	P, IV, IM	*IVP:* 20mg-40mg over 1 min *IV:* do not exceed 4mg/min	Any		No
					- Protect from light	

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Common Injectable Medication Notes (*BOP Technical Guidance, September 2012*)

(see listings in References section, or the respective package insert, for additional information and patient-specific dosing)

Drug Name (Brand)	Commercially Available Strength(s)	Admin	Infusion Time & Flow Rate	Fluid Compatibility	Ready to Use?	Refrigerate after Compounding?
					Notes	
Gentamicin sulfate (Garamycin)	10mg/mL 40mg/mL *PB:* 60mg 80mg 100mg 120mg	IM, IV	30 min	Any	Premixed bag	No
					- IM preferred when possible, use IV in paralyzed patients	
Glatiramer acetate (Copaxone)	20mg/mL	SQ			PFS	Yes, RT to inject
					- Rotate injection sites	
Glucagon Kit (Glucagon)	1mg	P, IV, IM, SQ	3-5 min		PFS	No
Haloperidol decanoate (Haldol)	100mg/mL 50mg/mL	IM				No
					- Do not give IV - Protect from light - Max volume per injection=3mL	
Haloperidol Lactate (Haldol)	5mg/mL	IV, P, IM		D5W		No
					- Protect from light - IV administration associated with higher risk of QT interval changes and torsade de pointes - Max: 15mg/ hr	
Heparin Lock Flush (Hep Flush)	1 unit/mL 2 unit/mL 10 units/mL 100 units/mL				PFS	No
					- Heparin lock flush solution is intended only to maintain patency of IV devices and is **NOT** to be used for anticoagulant therapy.	
Hydrocortisone sodium succinate (Cortef)	125mg/mL 100mg/mL 500mg 1g	IM, P, IV	*IVP:* 30 sec, *≥500mg:* 10 min *IV:* 20-30 min	Any		No
					- Protect from light - IM injection deep into gluteal muscle	
hydrOXYzine HCl (Atarax)	25mg/mL 50mg/mL	IM				No
					- IM injection into the upper outer quadrant of the gluteus maximus or the midlateral thigh - Protect from light	
Imipenem/Cilastin (Primaxin)	250mg 500mg	IM, IV	*≤500mg:* 20-30 min *>500mg:* 40-60 min	Any	Bag & vial system	No
					- Administer IM within 1 hour of reconstitution	

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					Notes	
Infliximab (Remicade)	100mg	IV	≥2 hrs	NS		Yes
					- Do not shake - Dilute dose in 250mL NS to between 0.4 and 4mg/ mL - Use non-PVC & non- DEHP bags and tubing - Use 1.2 micron or smaller filter - Infusion should begin within 3 hours of reconstitution - Patient must be monitored for infusion reactions (see medication insert)	
Interferon ALFA-2B (Intron-A)	Multiple available; refer to clinical pharmacist	SQ, IM, IV	20 min	NS, LR	PFS	Yes
					- Rotate subQ injection sites - Administer in evening - Do not shake - Different vial strengths require different amounts of diluent. Not every dosage form is appropriate for every indication; refer to manufacturer's labeling	
Interferon alfacon-1 (Infergen)	15mcg/0.5mL 9mcg/0.3mL	SQ				Yes
					- Do not shake vigorously - Administer at room temp	
Interferon BETA-1A (Avonex, Rebif)	30mcg (Avonex) 22mcg (Rebif) 44mcg (Rebif)	IM (Avonex) SQ (Rebif)			PFS, Injection kit	Yes
					- Administer IM into thigh or upper arm - Do not shake when reconstituting - Protect from light	
Interferon BETA-1B (Betaseron, Extavie)	0.3mg/9.6MIU (Betaseron) 0.3mg/mL (Extavia)	SQ			Injection kit	No
					- Use only the diluent supplied by manufacturer - Do not shake - If not used immediately following reconstitution, refrigerate solution and use within 3 hours; rotate injection sites	
Iron dextran (Dexferrum, Infed)	50mg/2mL	IM, P, IV	*IVP:* ≤50mg/min *IV infusion:*1–6 hours	D5W, NS		No
					- Use of D5W instead of NS may be associated with a higher incidence of local pain and phlebitis - IM into the upper outer quadrant of the buttock only - Dexferrum is for IV administration only - A test dose should be given on first day of therapy (see medication insert) - Resuscitation equipment and trained personnel should be available every time the medication is given	
Ketorolac (Toradol)	30mg/mL	IM, P	IVP: 15 sec	Any	Carpuject	No
					- Protect from light	

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					Notes	
Levofloxacin (Levaquin)	25mg/mL 250mg/50mL 500mg/100mL 750mg/150mL	IV	<750 mg: 60 min ≥750 mg: 90 min	D5W, NS	Premix bag	No
					- Protect from light - Maintain adequate hydration of patient to prevent crystalluria	
Linezolid Premix (Zyvox)	200mg/100mL 600mg/300mL	IV	30–120 min	Any	Premix bag	No
					- Protect from light	
MedroxyPROGESTERone (Depo-Provera, Depo-SubQProvera 104)	400mg/mL 150mg/mL	IM, SQ			PFS	No
					- Depo-SubQProvera 104 is SQ only, Depo-Provera for IM only	
Meropenem IV (Merrem IV)	500mg 1g	P, IV	*IVP:* 3-5 min *IV:* 15-30 min	Any		Only after mixing
methylPREDNISolone acetate (Depo-Medrol)	40mg/mL 80mg/mL	IM				No
					- Do NOT give IV	
methylPREDNISolone sodium succinate (Solu-Medrol)	40mg 125mg 250mg 500mg 1g	IM, P, IV	*IVP:* 1-15 min *IV:* 15-60 min *>500mg:* 30-60 min *> 1g:* ≥60 min	D5W, LR, NS		No
					- Doses > 2mg/kg or 250mg should be given IV - Do not use for intraarticular injections	
Metoclopramide HCl (Reglan)	5mg/mL	IM, P, IV	*IVP:* 1-2 min *IV:* 15-30 min	Any		No
					- Doses >10mg should be given IV, diluted in 50mL of NS - Protect from light - Rapid IV may be associated with anxiety and restlessness, followed by drowsiness - Pretreat with diphenhydramine to decrease risk of extrapyramidal reactions	
METRONIDazole/ Sodium chloride (Flagyl)	500mg	P, IV	30-60 min	D5W, NS	Piggyback, Premix	No
					- Avoid contact of drug solution with equipment containing aluminum	
Micafungin sodium (Mycamine)	50mg 100mg	IV	1 hour	D5W, NS		No
					- Protect from light - Do not shake	
Morphine sulfate	Various	P, IV	*IVP:* Dilute to final concentration of 1-2mg/mL given 1-10mg/hr or over 4-5 min *IV:* 1-10mg/hr	Any IVP: NS, SWFI preferred	Bag & vial system, PFS	No
					- Doses > 10mg/mL should only be given using continuous controlled-microinfusion devices	

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					Notes	
Nafcillin sodium (Nafcillin)	1g 2g	IM, IV	*IV:* 30-60 min	Any	Bag & vial system, Premix bag	Only after mixing
					- Rotate sites - Vesicant - Inject IM into large muscle (i.e., thigh or gluteal)	
Nalbuphine hydrochloride (Nubain)	10mg/mL 20mg/mL	SQ, IM, IV	10-15 min	D5W, NS		No
Naloxone hydrochloride (Narcan)	400mcg/mL 1mg/mL	IM, SQ, P, IV	*IVP:* 30 sec	D5W, NS	PFS	No
					- Do not mix with alkaline solutions	
Olanzapine IM (Zyprexa IM)	10mg	IM				No
					- Short-acting IM injection: For IM administration only	
Ondansetron (Zofran)	4mg/2mL	P, IV, IM	*IVP:* 2-5 min *IV:* 15-30 min	Any	PFS	No
					- Protect from Light	
Pegfilgrastim (Neulasta)	6mg/ 0.6mL	SQ			PFS	Yes
					- Do not administer in the period between 14 days before and 24 hours after administration of cytotoxic chemotherapy - Protect from light - Do not shake	
Peginterferon ALFA 2B (Peg-Intron)	50mcg 80mcg 120mcg 150mcg	SQ			Injection kit	Yes
					- For SubQ administration, rotate injection site - Invert to mix; do not shake	
Peginterferon ALFA-2A (Pegasys)	180mcg/ 0.5mL	SQ			PFS	Yes
					- Administer in the abdomen or thigh - Rotate injection site - Injection kit and vials have different drug concentration and volumes are not interchangeable - Do not shake	
Penicillin G benzathine (Bicillin L-A)	1.2 MU/2mL 2.4 MU/4mL	IM			PFS	Yes, RT to inject
					-Administer by deep IM injection in the upper, outer quadrant of the buttock	
Penicillin G potassium (Pfizerpen)	5 MU 20 MU	IM		Any		No

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					Notes	
Penicillin G procaine (Wycillin)	600,000 U/mL	IM			PFS	Yes
					- Avoid IV, intravascular, or intra-arterial administration of penicillin G procaine since severe and/or permanent neurovascular damage may occur	
Penicillin G sodium	5 MU	IM		Any		No
Phenytoin (Dilantin)	50mg/mL	IM, P, IV	*IV:* max 50mg/min	NS, LR	PFS	No
					- Avoid IM and IVP administration if possible - Do not use IM for status epilepticus - Status epilepticus: IV loading dose: 10-20 mg/kg - Avoid extravasation. Following IV administration, NS should be injected through the same needle or IV catheter to prevent irritation. - Complete infusion admin within 1 hour of preparation - An in-line filter of 0.22—0.55 microns should be used	
Phytonadione (Mephyton)	1mg/ 0.5mL 10mg/mL	P, SQ	*IVP:* max 1mg/min	NS, D5W, D5NS	PFS, Ampule	No
					- Avoid IM injection - SubQ is the preferred route; - Use IV only when other routes are not feasible	
Piperacillin/ Tazobactam (Zosyn)	2g/ 0.25g 3g/ 0.375g 4g/ 0.5g 36g/ 4.5g	IV	30 min	Any	Premix bag, Bag & vial system	Only after mixing
					- *Note:* Dosing based on piperacillin component - Frozen Galaxy containers: must be kept in ultra-cold freezer prior to defrosting for use	
Potassium chloride	2mEq/mL 4mEq/mL 40mEq/1000mL 20mEq/1000mL 30mEq/1000mL 10mEq/1000mL	IV	*Peripheral IV:* ≤10mEq/hr *Central IV:* Max. 20mEq/IV in emergency situation only	NS		No
					- Potassium must be diluted prior to parenteral administration - Continuous ECG monitoring upon infusion into central line - Available ready to use in infusion pumps from Hospira	
Prochlorperazine edisylate (Compazine)	5mg/ mL	IM, P, IV	*IVP:* <5mg/min	Any		No
					- Protect from light - To reduce the risk of hypotension, remain lying down and be observed for at least 30 min following administration.	
Progesterone	50mg/mL	IM				No

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					Notes	
Promethazine (Phenergan)	25mg/mL 50mg/mL	IM, IV	*IV:* 10-15 min *Max infusion rate:* 25mg/min	Any	PFS	No
					- Extravasation has been associated with cases of severe tissue damage. - IM is preferred route of administration - IV infusion max concentration is 25 mg/ mL - Run IV line at port farthest from patient's vein, or through a large bore vein (not hand or wrist), and discontinue immediately if burning or pain occurs with administration. - Inject IM in large muscle (i.e., thigh or gluteal)	
Pyridoxine HCl (Aminoxin)	100mg/mL	IM, SQ, IV	*IV:* 15-30 minutes, Pt with seizure:, maximum of 1g/min			No
					- Seizures have occurred with large IV doses - Protect from light	
Ranitidine (Zantac)	25mg/mL 50mg/mL 50mg/50mL 0.45% NaCl	IM, P, IV	*IVP:* ≤4mL/min Dilute to ≤ 2.5mg/mL *IV:* 15-20 min Dilute to ≤ 0.5mg/mL	Any	Premix bag	No
Rifampin (Rifadin)	600mg	IV	30 min to 3 hrs	D5W, NS		No
					- Final concentration not to exceed 6mg/ mL	
Risperidone (Risperdal CONSTA)	12.5mg 25mg 37.5mg 50mg	IM		Mfg diluent only	Injection kit	Yes, RT to inject
					- Use 1 inch needle for IM injections in deltoid administration (alternate between arms) - Use 2 inch needle for gluteal administration (alternate between buttocks) - Inject into upper outer quadrant of gluteal area or deltoid, alternating between arms and buttocks - Use within 6 hrs of reconstitution	
Sodium bicarbonate	Various	IV, P	4-8 hours		PFS	No
					-For less urgent metabolic acidosis: 2 to 5 mEq/ Kg over 4 to 8 hours	
Sulfamethoxazole/ Trimethoprim (Bactrim IV)	80mg-16mg/mL	IV	60-90 min	D5W		No
					- Dilute well before giving - Use diluted solution within 6 hours of preparation - Protect from light	
Sumatriptan (Imitrex)	6mg/ 0.5mL 4mg/ 0.5mL	SQ			Injection kit	No
					- Max of two 6 mg doses in 24 hours – doses to be separated by at least 1 hour	
Testosterone cypionate (Depo-Testosterone)	100mg/mL 200mg/mL	IM				No
					- Protect from light - Inject into the upper outer quadrant of gluteal muscle	
Thiamine (Vitamin B-1)	100 mg/mL	IM, P, IV		Any		No
					- Slow IV infusion (≥30 min) helps to limit local injection reaction	

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					Notes	
Ticarcillin/ Clavulanate acid (Timentin)	3.1g	IV	30 min	Any	Bag & vial system, Premix bag	Only after mixing
					- Darkening of drug indicates loss of potency	
Tobramycin sulfate (Nebcin)	10mg/mL 40mg/mL 60mg/50mL 80mg/100mL	IV, IM	30-60 min	NS, D5W	Bag & vial system, Premix bag	Only after mixing
					-IM is discouraged unless IV access cannot be obtained	
Trimethobenzamide HCl (Tigan)	100mg/mL	IM				No
					- IM injection into the deep injection into the upper outer quadrant of the gluteal muscle minimizes injection site reactions.	
Vancomycin HCl (Vancocin)	500mg 750mg 1g 5g	IV	30 min for every 500mg infused	Any	Bag & vial system, Premix bag	Bag & Vial System: Only after mixing Premix bag: Yes
					- Max final concentration of 5mg/ mL - Can use concentrations of 10 mg/ mL for fluid restricted patients but increases risk of infusion related events - Each 1g must be diluted in 200mL of fluid - Red man syndrome may occur if infusion is too rapid. It is not an allergic reaction, but characterized by hypotension and/or a maculopapular rash appearing on the face, neck, trunk, and/or upper extremities. If this occurs, slow the infusion rate to over $1^{1}/_{2}$ to 2 hours and increase the dilution volume - Available as frozen premix in GALAXY containers	

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